

C. Claims

Please cancel claim 1 without prejudice or disclaimer and amend claims 2-6 as follows. A complete listing of all the claims appears below; this listing replaces all earlier amendments and listings of the claims.

1. (Cancelled)

2. (Currently Amended) A method for producing a liquid discharge head according to claim 1; including a discharge energy generating element for generating energy for discharging a liquid droplet; an element substrate provided with said discharge energy generating element on a principal plane thereof; and an orifice substrate provided with a discharge port portion including a discharge port for discharging a liquid droplet, a bubble generating chamber for generating a bubble in a liquid therein by said discharge energy generating element, a nozzle including a supply path for supplying said bubble generating chamber with the liquid, and a supply chamber for supplying said nozzle with the liquid, and adjoined to the principal plane of said element substrate, the method comprising the steps of:

coating, on the element substrate in which said discharge energy generating element is provided on the principal plane, a solvent-soluble thermally cross-linkable organic resin for forming a pattern of a first bubble generating chamber and a first flow path and heating the resin thereby forming a thermally cross-linked film;

coating, on said thermally cross-linked film, a solvent-soluble organic resin for forming a pattern of a second bubble generating chamber and a second flow path;

forming, in said organic resin, a second flow path pattern of a smaller height than in said second bubble generating chamber simultaneously with a pattern of said second bubble generating chamber, by employing a locally different exposure amount;

laminating a negative-working organic resin layer on said thermally cross-linked film and said patterned organic resin and forming said discharge port portion in said negative-working organic resin layer; and

removing said thermally cross-linked film and said patterned organic resin,

wherein the pattern of the second flow path having a lower height than in said second bubble generating chamber is formed by an exposure of said organic resin, employing a slit mask having a slit pitch and then developing said organic resin.

3. (Currently Amended) A method for producing a liquid discharge head according to claim 1, including a discharge energy generating element for generating energy for discharging a liquid droplet; an element substrate provided with said discharge energy generating element on a principal plane thereof; and an orifice substrate provided with a discharge port portion including a discharge port for discharging a liquid droplet, a bubble generating chamber for generating a bubble in a liquid therein by said discharge energy generating element, a nozzle including a supply path for supplying said bubble generating chamber with the liquid, and a supply chamber for supplying said nozzle with the liquid, and adjoined to the principal plane of said element substrate, the method comprising the steps of:

coating, on the element substrate in which said discharge energy generating element is provided on the principal plane, a solvent-soluble thermally cross-linkable

organic resin for forming a pattern of a first bubble generating chamber and a first flow path and heating the resin thereby forming a thermally cross-linked film;

coating, on said thermally cross-linked film, a solvent-soluble organic resin for forming a pattern of a second bubble generating chamber and a second flow path;

forming, in said organic resin, a second flow path pattern of a smaller height than in said second bubble generating chamber simultaneously with a pattern of said second bubble generating chamber, by employing a locally different exposure amount;

laminating a negative-working organic resin layer on said thermally cross-linked film and said patterned organic resin and forming said discharge port portion in said negative-working organic resin layer; and

removing said thermally cross-linked film and said patterned organic resin,

wherein the pattern of said second bubble generating chamber and said second flow path is are formed, after an exposure-development step through a mask, by a formation of an inclination of 10° to 45° by the application of a temperature.

4. (Currently Amended) ~~A~~ The method for producing a liquid discharge head according to claim 2, wherein said second flow path pattern is formed with two or more step differences by exposing and developing said organic resin, utilizing a mask having different slit pitches.

5. (Currently Amended) A method for producing a liquid discharge head ~~including:~~ including a discharge energy generating element for generating energy for discharging a liquid droplet; an element substrate provided with said discharge energy

generating element on a principal plane thereof; and an orifice substrate provided with a discharge port portion including a discharge port for discharging a liquid droplet, a bubble generating chamber for generating a bubble in a liquid therein by said discharge energy generating element, a nozzle including a supply path for supplying said bubble generating chamber with the liquid, and a supply chamber for supplying said nozzle with the liquid, and adjoined to the principal plane of said element substrate, the method comprising the steps of:

~~a step of~~ coating, on the element substrate in which said discharge energy generating element is provided on the principal plane, a solvent-soluble thermally cross-linkable organic resin for forming a pattern of a first bubble generating chamber and a first flow path and heating the resin thereby forming a thermally cross-linked film;

~~a step of~~ coating, on said thermally cross-linked film, a solvent-soluble organic resin for forming a pattern of a second bubble generating chamber and a second flow path;

~~a step of~~ exposing and developing said organic resin employing a slit mask having partially different slit pitches and a near-UV light, in order to form a pattern of said second bubble generating chamber and a second flow path having different plural heights;

~~a step of~~ heating said organic resin, subjected to the pattern formation by exposure and development, at a temperature not exceeding a glass transition point to thereby form an inclination of 10° to 45°;

~~a step of~~ exposing and developing said thermally cross-linked film employing a deep-UV light of a region of 200 to 300 nm;

~~a step of~~ coating, exposing, developing and heating a negative-working organic resin on the flow path pattern formed by said two-layered solvent-soluble film, thereby laminating said orifice substrate having said discharge port portion; and

~~a step of~~ irradiating, through said orifice substrate, the underlying two-layered organic resin for forming the flow path with a deep-UV light, followed by removal with a solvent, thereby forming said orifice substrate including said discharge port portion for discharging a liquid droplet, said bubble generating chamber in which the bubble is generated by said discharge energy generating element, said nozzle having said supply path for supplying said bubble generating chamber with the liquid, and said supply chamber for supplying said nozzle with the liquid, and adjoined to the principal plane of said element substrate.

6. (Currently Amended) ~~Δ~~ The producing method for a liquid discharge head according to claim 5, wherein said first flow path is formed with a height of 5 to 20 μm on said element substrate and with an inclination of 0° to 10° with respect to a plane perpendicular to the principal plane of said element substrate.